

Claims

What is claimed is:

5 1. A method comprising:

receiving a resonant frequency of an apparatus as an input;

calculating a set of coefficients for a notch filter, wherein the notch filter has a notch frequency that is approximately equal to the resonant frequency and wherein the set of notch filter coefficients are calculated

10 using fixed-point arithmetic; and

programming a digital filter in the apparatus in accordance with the set of notch filter coefficients,

whereby a notch filter that attenuates the resonant frequency is obtained.

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2. The method of claim 1, wherein the set of coefficients are calculated by evaluating a polynomial.

20 3. The method of claim 2, wherein the polynomial is a polynomial interpolation of a non-linear function.

4. The method of claim 3, wherein the non-linear function is derived from a transformation of a notch filter transfer function from the s-domain to the z-domain.

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5. The method of claim 4, wherein the non-linear function is derived from a bilinear transformation of the notch filter transfer function from the s-domain to the z-domain.

6. The method of claim 1, wherein the set of coefficients are calculated by evaluating an interpolating function that approximates an original function.
- 5 7. The method of claim 6, wherein the original function is derived from a z -domain notch filter transfer function.
- 10 8. The method of claim 7, wherein the z -domain notch filter transfer function is obtained by transformation of an z -domain notch filter transfer function.
- 15 9. The method of claim 8, wherein the z -domain notch filter transfer function is obtained by bilinear transformation of the s -domain notch filter transfer function.
10. The method of claim 1, wherein the notch filter is a digital notch filter.
11. An apparatus comprising:
 - a moveable assembly susceptible to a resonant frequency;
 - 20 control circuitry that controls the moveable assembly, the control circuitry is adapted to:
 - calculating a set of coefficients for a filter, wherein the filter has an attenuation frequency that is approximately equal to the resonant frequency and wherein the set of coefficients are calculated using fixed-point arithmetic; and
 - 25 programming a digital filter in the apparatus in accordance with the set of notch filter coefficients.
 12. The apparatus of claim 11, wherein the set of coefficients are calculated
30 by evaluating a polynomial.

13. The apparatus of claim 12, wherein the polynomial is a polynomial interpolation of a non-linear function.
- 5 14. The apparatus of claim 13, wherein the non-linear function is derived from a transformation of a notch filter transfer function from the s -domain to the z -domain.
- 10 15. The apparatus of claim 14, wherein the non-linear function is derived from a bilinear transformation of the notch filter transfer function from the s -domain to the z -domain.
- 15 16. The apparatus of claim 11, wherein the set of coefficients are calculated by evaluating an interpolating function that approximates an original function.
- 20 17. The apparatus of claim 16, wherein the original function is derived from a z -domain notch filter transfer function.
- 25 18. The apparatus of claim 17, wherein the z -domain notch filter transfer function is obtained by transformation of an z -domain notch filter transfer function.
19. The apparatus of claim 18, wherein the z -domain notch filter transfer function is obtained by bilinear transformation of an s -domain notch filter transfer function.
20. The apparatus of claim 11, wherein the notch filter is a digital notch filter.

21. An apparatus comprising:
 - at least one processor;
 - memory; and
 - a set of instructions in the memory,

5 wherein the at least one processor executes the set of instructions to perform actions that include:

 - receiving a desired notch frequency as input;
 - calculating a set of notch filter coefficients for a notch filter having the desired notch frequency, and wherein the set of notch filter coefficients

10 are calculated using fixed-point arithmetic; and

 - writing the set of notch filter coefficients to the memory so as to program a digital filter in accordance with the set of notch filter coefficients,

15 whereby a notch filter that attenuates the resonant frequency is obtained.

- 22. The apparatus of claim 21, wherein the at least one processor executes additional instructions that implement the programmed digital filter.

- 20 23. The apparatus of c11A, wherein the set of notch filter coefficients are calculated by evaluating an interpolating function that approximates an original function.

- 25 24. The apparatus of claim 23, wherein the original function is derived from a z-domain notch filter transfer function.

- 25 25. The apparatus of claim 24, wherein the z-domain notch filter transfer function is obtained by transformation of an z-domain notch filter transfer function.

26. The apparatus of claim 25, wherein the z -domain notch filter transfer function is obtained by bilinear transformation of an s -domain notch filter transfer function.